DLA-94-P10085

ZERO DEMAND RETENTION LIMITS

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AUGUST 1994

FOR
DEPARTMENT OF DEFENSE
DEFENSE LOGISTICS AGENCY
Executive Director (Supply Management)
CAMERON STATION
ALEXANDRIA, VA 22304-6100

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INSIGHT THROUGH ANALYSIS

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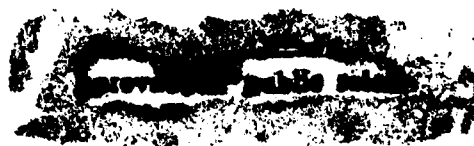
ZERO DEMAND RETENTION LIMITS

AUGUST 1994

BRUCE E. LASSWELL

DEPARTMENT OF DEFENSE
DEFENSE LOGISTICS AGENCY
Operations Research Office

DEFENSE LOGISTICS AGENCY
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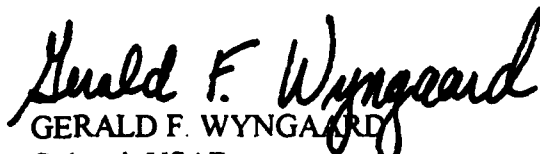**RICHMOND, VIRGINIA 23297-5082**

IN REPLY
REFER TO

FOREWORD

In 1992 the General Accounting Office (GAO) recommended that the Defense Logistic Agency (DLA) dispose of items that had not experienced demands for two years. In March 1992 the DLA Executive Director for Supply Management tasked the DLA Operations Research Office (DORO) to support Inventory Hearings by conducting a quick analysis to evaluate the cost impacts of disposing of all inventory for NSNs that have had no demand for two years. The cost of a two year policy was estimated and compared to the cost associated with maintaining current stockage practices.

DORO's abbreviated analysis showed that given actual item transaction histories, cost savings could have been realized for certain hardware commodities if a two year policy had been implemented beginning in FY 87. The savings, however, were contingent on the validity of the cost factors used in the analysis.

This study was initiated to provide a much more comprehensive look at alternative retention policies and to recommend a policy or policies relating to the retention of zero demand stockage.

Use of the results of this study can help DLA maintain effective customer support at the lowest possible cost.

GERALD F. WYNGAARD
Colonel, USAF
Chief, DLA Operations Research Office

PURPOSE

To investigate variou. ᴈero demand time limit rules for disposal of assets from DLA's inventory stocks. These rules should be based on the probability of receiving a demand for an asset once a decision has been made to dispose of it, and on the cost effectiveness of removing zero demand assets from inventory.

As part of the inventory reduction initiatives generated by DMRD 901/987, DLA is examining its inventory procedures with the goal of reducing the amount of on-hand stocks. One aspect of this review is the investigation of how long we should allow an item to experience no demands before we dispose of it. The current DLA policy is five years but lacks an apparent analytical basis. In 1992, the General Accounting Office recommended that DLA consider a two year retention policy. At the request of the DLA Executive Director for Supply Management, DORO conducted an abbreviated analysis in March 1992, DLA-92-C20155, which examined the cost effectiveness of disposing of assets in the construction, electrical, general, and industrial commodity areas which had not had demands for the two years prior to FY 86. The consultation concluded that in certain instances, a two year zero demand retention policy was cost effective. Due to time constraints, however, the consultation did not consider other retention options, did not consider the other DLA commodities, and did not consider the impact of weapon system or war reserve items. This study addresses all of those issues with the objectives shown on the next chart.

OBJECTIVES

- Develop a database of NSNs having discrete, mutually exclusive zero demand periods of two through five years
- Identify the probabilities of zero demand NSNs having subsequent demands
- Develop an analytic zero demand retention cost model
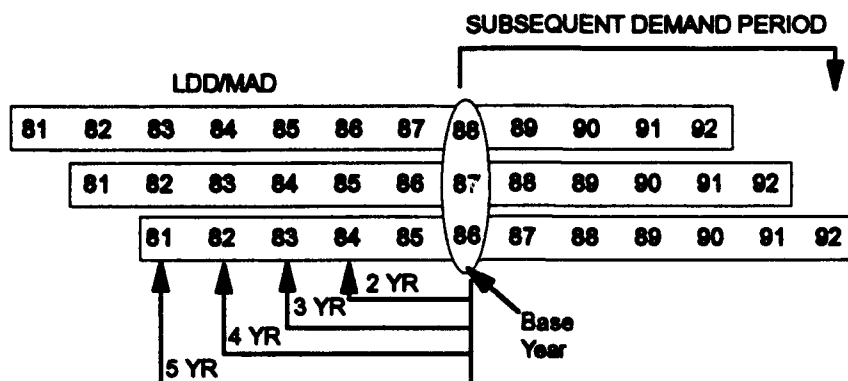- Use the cost model to develop economic decision rule(s) for retention of zero demand NSNs

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This annotated briefing is structured along the lines of the objectives shown here. First we will discuss how the zero demand data bases were constructed, then look at the empirical probability stratifications, discuss the development of the cost model, and then look at the retention limits results and recommendations.

The analysis expands on the March 1992 consultation by looking at all DLA commodities except fuel and subsistence and by developing economic decision rules for the retention of zero demand items based on the results of an expected value cost model. The commodities included in the analysis are Construction (C), Electronics (E), General (G), Industrial (I), Medical (M), and Textiles (T). NSNs were selected having discrete, mutually exclusive zero demand periods of two, three, four, and five years. Probabilities of having demands after the zero demand period were then developed for groupings of NSNs that were considered logical (commodity and Federal Supply Class (FSC)), of interest to the study sponsor (User code), and of significant general interest (Weapon System Indicator code (WSIC) and Mobilization Reserve code (MRC)). These probabilities were then used in conjunction with storage, issue, and reprocurement costs as primary inputs into a cost model. The model computes the total cost of meeting five years worth of expected demands by either holding zero demand stock and issuing from inventory or by disposing of zero demand stock and reprocuring to meet demands. The comparison of those costs is used to identify retention limits.

First, we will discuss the development of our zero demand databases.

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NSN SELECTION AND PROBABILITY DEVELOPMENT

SUBSEQUENT DEMAND PERIOD

LDD/MAD

| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 |

| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 |

| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 |

2 YR
3 YR
4 YR
5 YR
Base Year

PROBABILITY = percentage of NSNs having one or more demands through FY 92 after experiencing no demands for X years ending with base years 86, 87, 88.

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In order to develop a large sample size, zero demand NSNs were selected from three consecutive years of data from the DLA Integrated Data Bank (DIDB) with base years FY 86, FY 87, and FY 88. Zero demand for periods of time from two through five years was based on either the Last Demand Date (LDD) or the Management Assume Date (MAD) if the LDD was zero. Lack of demand was the only selection criteria for NSNs. There was no *a posteriori* screening of the NSNs. In other words, the fact that management of an NSN terminated at some point in the future or the fact that an NSN's inventory was or went to zero was not an excluding criterion. The only other factor that was considered was NSNs that migrated from one commodity to another. NSNs that were selected as zero demand for some period under one commodity but then moved to a different commodity (FSC 1560, for example, moved from Industrial to General) were considered under their new commodity for the entire period. For each of the selected NSNs, the DIDB was then searched forward in time from the base year to the maximum extent of the data (FY 92 at the time this data was developed) to identify subsequent demands. NSNs either did or did not have subsequent demands. Probabilities of demand were then computed as the percentage of NSNs in a particular grouping (commodity and FSC at the lowest level) that experienced one or more demands. Once the zero demand NSNs are selected, we need to put the magnitude of them in perspective.

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ZERO DEMAND NSNs/FSCs & %

COMMODITY

		C	E	G	I	M	T
Y	2	64964/105 13.2%	152383/86 17.3%	42822/138 14.4%	136959/ 57 15.7%	877/65 1.7%	1303/16 4.6%
E	3	42970/987 8.7%	106663/76 12.1%	30103/133 10.1%	90884/54 10.4%	432/45 0.8%	945/15 3.3%
A R	4	37756/94 7.6%	86558/76 9.8%	31280/119 10.5%	73600/49 8.4%	264/35 0.5%	766/13 2.7%
S	5	26622/86 5.4%	58276/71 6.6%	20402/110 6.8%	47273/46 5.4%	128/28 0.2%	821/11 2.9%

This table shows the number of the zero demand NSNs selected for each commodity - the total number of NSNs selected, the number of FSCs represented, and the percentage of the total number of NSNs in the commodity that the zero demand NSNs represent. For example, the number of two year zero demand NSNs identified under the Construction commodity was 64964. These NSNs were grouped into 105 FSCs and represented 13.2% of the total number of NSNs listed as being currently managed under that commodity in FYs 86-88. For any single zero demand period, zero demand NSNs represent between 0.2% and 17.3% of the total NSNs listed in a commodity. It is significant to note that the hardware commodities (C, E, G, I) have large sample sizes while medical and textile do not. This has some effect on the stability of the demand probabilities that will be developed. We can also look at the zero demand NSNs from an inventory value perspective.

ZERO DEMAND
Average Issuable Inventory Value / %

COMMODITY

		C	E	G	I	M	T
Y	**2**	$74M / 4.5%	$90M / 4.9%	$51M / 4.2%	$48M / 3.1%	$1.2M / .3%	$5.2M / .4%
E	**3**	$45M / 2.7%	$59M / 3.2%	$35M / 2.9%	$29M / 1.9%	$0.5M / .13%	$8.7M / .6%
A							
R	**4**	$39M / 2.4%	$46M / 2.5%	$28M / 2.3%	$22M / 1.4%	$0.3M / .08%	$7.7M / .6%
S	**5**	$25M / 1.5%	$30M / 1.6%	$13M / 1.1%	$14M / .9%	$0.2M / .05%	$7.2M / .5%
TOTAL		$183M / 11.2%	$225M / 12.2%	$127M / 10.4%	$113M / 7.3%	$2.2M / .58%	$28.9M / 2.1%

The average value of zero demand issuable assets is shown in this table. The values are annual averages because we are dealing with three years of data. We can see from this table that the dollar value percentage of zero demand NSNs is relatively low compared to the percentage of NSNs involved (last table). For a single zero demand period, the dollar investment in these NSNs for a single commodity ranges between 0.05% and 4.9% of the total commodity issuable asset value while the NSN count is between 0.2% and 17.3%. The total row shows what the immediate effect (as opposed to recurring effect) would be for each commodity of adopting a two year retention policy as recommended by the GAO. Initially, NSNs with zero demand periods of three through five years would also be eliminated under a two year policy. After the initial disposals, only the two year effects would continue to recur. There are NSNs with zero demand periods greater than five years but since they already exceed DLA's existing retention policy, we must assume that they are being retained for reasons that would remain valid under a new policy. A final perspective is the issuable item volume occupied by zero demand NSNs.

ZERO DEMAND
Average Issuable Inventory Volume (1000ft) / %

COMMODITY

		C	E	G	I	M	T
Y	**2**	1063.16 / 5.7%	313.75 / 9.2%	785.46 / 3.2%	997.16 / 2.7%	21.44 / .32%	421.24 / 2.2%
E	**3**	664.42 / 3.6%	187.86 / 5.5%	475.33 / 1.9%	503.33 / 1.4%	8.1 / .12%	314.26 / 1.7%
A							
R	**4**	539.42 / 2.9%	146.48 / 4.3%	450.42 / 1.8%	364.61 / 1.0%	5.3 / .08%	204.50 / 1.1%
S	**5**	343.77 / 1.9%	96.75 / 2.8%	246.1 / 1.0%	203.47 / 0.6%	1.62 / .02%	196.33 / 1.0%
TOTAL		2610.77 / 14.1%	744.84 / 21.8%	1957.31 / 7.9%	2068.57 / 5.7%	36.46 / .54%	1136.33 / 6.06%

This table shows the volume in cubic feet that zero demand NSNs occupy (item cube as opposed to storage cube) and the percentage of total commodity item volume that the NSNs represent. For example, two year zero demand NSNs for the Construction commodity occupy 5.7% of the total Construction item volume. It was outside the scope of this study to convert item volume into storage type (bin, bulk etc.) and storage volume. Storage volume might become important however if space becomes critical due to congressionally directed depot realignment and closure (BRAC) in the future. Again, as on the previous table, the total row represents the immediate effects (as opposed to recurring effects) of implementing a two year retention policy.

Once the zero demand NSNs have been identified, they will be grouped in order to develop the probabilities of demand.

ZERO DEMAND NSN GROUPINGS

- **Commodity (C,E,G,I,M,T)**
- **Federal Supply Class (FSC)**
- **Weapon System Indicator Code (WSIC) - three categories**
- **Mobilization Reserve Code (MRC) - two categories**
- **User Code - six categories**

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For the purposes of this study, NSNs were grouped in several ways in order to develop classes of demand probabilities. An individual NSN has a demand probability of either 0 or 100 percent and therefore has little value in this analysis by itself. Commodity and FSC groupings were chosen because they are logical groupings and represent the two extremes of aggregation (highest to lowest) in which the data can be represented. The other groupings were selected either by study sponsor interest (User code) or by characteristics of significant general interest that were identified as shortcomings in the March 1992 consultation (WSIC, MRC). The purpose of these other groupings was to determine if these characteristics differentiated the items from their respective commodity or FSC to such an extent that they should be treated differently. The three Weapon System Indicator code groupings were (1) renders item inoperable (code X), (2) affects safe or effective operation (code W), and (3) does not render weapon inoperable or item is not for a weapon system (codes N,Y,Z). The two categories of Mobilization Reserve code were (1) item has a war reserve or other reserve requirement (codes H,S), and (2) item has no requirement (N). The six categories of user codes were (1) single user Army, (2) single user Air Force, (3) single user Navy, (4) single user Marines, (5) combination of two or more users, and (6) other users or no indicated user. Now that the zero demand NSNs have been identified and grouped, the probabilities of having future demands can be examined.

CONDITIONAL PROBABILITY OF DEMAND

(COMMODITY REGRESSION LINES)

Probability of Demand (%)

YEARS WITHOUT DEMAND
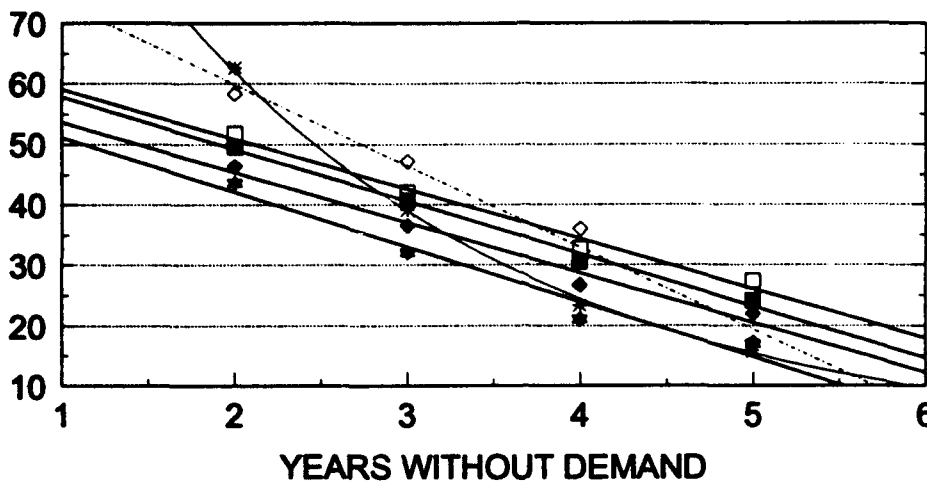
C   E   G   I   M   T

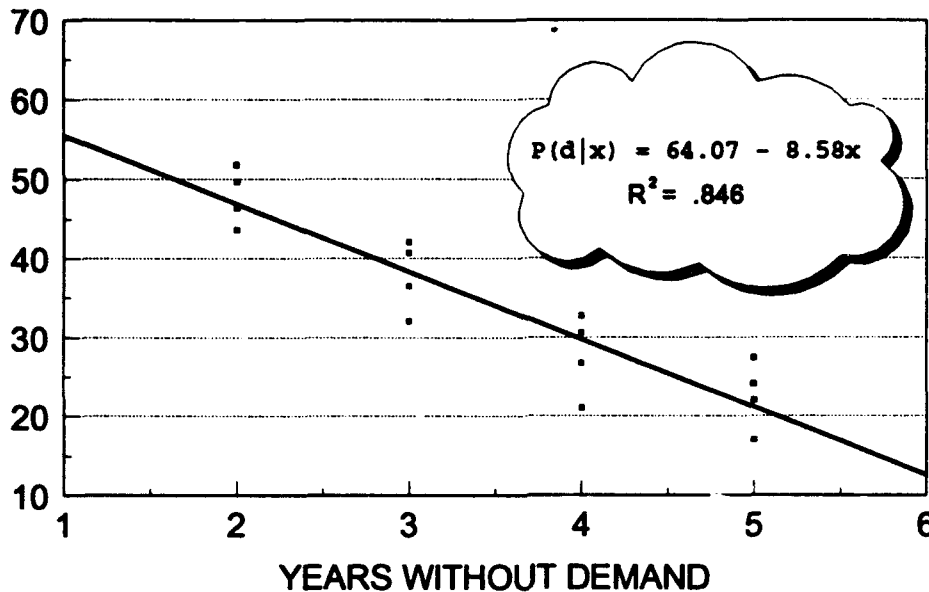DEFENSE LOGISTICS AGENCY
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This chart shows regression lines for the demand probabilities for each of the commodities. The probabilities are conditional on the appropriate zero demand period. Regression was used because it can determine if there is a mathematical relationship between the data points. If the coefficient of determination of the regression line is close to 1.0, then a regression equation will accurately show how the demand probabilities vary with the zero demand period and the cost model can use the regression results. Each of the regression lines except the one for Textiles is linear with coefficients of determination ranging from .96246 for General to .9929 for Construction. The Textile regression line is exponential with a coefficient of determination of .99711. Regardless of the commodity, the demand for zero demand items drops rapidly and consistently after two years. Textiles and Medical are clearly different from the hardware (C,E,G,I) commodities in their behavior in terms of the slope and shape of their regression lines. They have higher probabilities of demand after two years than the hardware commodities but are the same after five years. An initial concern during the development of the demand probabilities was whether or not Foreign Military Sales items should be excluded. Since FMS items represent less than 0.2% of the NSNs selected, it was decided that they would not have an impact in terms of biasing the probabilities. Now that we have completed constructing regression lines for each commodity, a natural extension is to examine whether a single line will accommodate all commodities.

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CONDITIONAL PROBABILITY OF DEMAND

HARDWARE COMMODITY (C,E,G,I) AVERAGE

Probability of Demand (%)

$$P(d|x) = 64.07 - 8.58x$$
$$R^2 = .846$$

YEARS WITHOUT DEMAND

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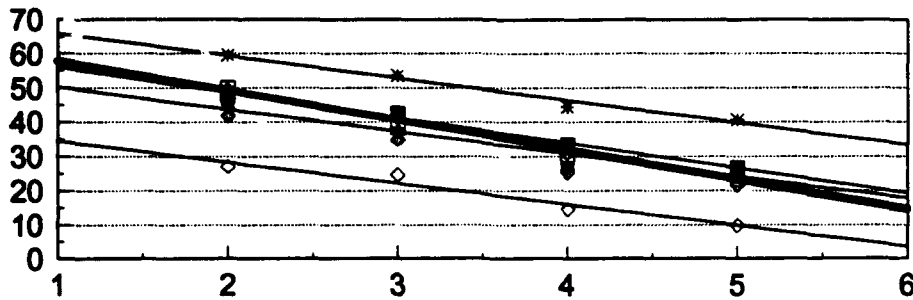OPERATIONS RESEARCH OFFICE   DORO

This chart shows that although there is some variation as a group (the coefficient of determination is .8464), the hardware commodities behave pretty much the same. The question then becomes - how do different NSN groupings behave relative to the commodity averages? We will address that next.

CONDITIONAL PROBABILITY OF DEMAND
CONSTRUCTION COMMODITY BY USER CODE

This chart shows the probabilities of demand for construction NSNs stratified by User code with the commodity average shown for reference. This chart is typical of those for all the hardware commodities (C, E, G, I). The general characteristics are: (1) combination or multiple users are above the commodity average, (2) single users are at or below the commodity average, and (3) Army users are closest to the commodity average. Textiles and Medical are very different. We will look at Textiles first.

CONDITIONAL PROBABILITY OF DEMAND
TEXTILE COMMODITY BY USER CODE

The probability of demand for Textile NSNs stratified by user code is the opposite of those for hardware commodities - all of the designated users are above the commodity average. NSNs for which no user is specified, which constitute a significant number of the total textile NSNs, are below the average. Medical NSNs are also different from the hardware commodities.

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DISTRIBUTION OF ZERO DEMAND MEDICAL NSNs BY USER CODE

Number of NSNs

93.7%
COMBINATION -
(TWO OR MORE USERS) IS
ESSENTIALLY THE ONLY
USER CATEGORY FOR MEDICAL
NSNs

ARMY	AIR FORCE	MARINES	NAVY	OTHER/NONE	COMBINATION
17	20	0	30	41	1,593

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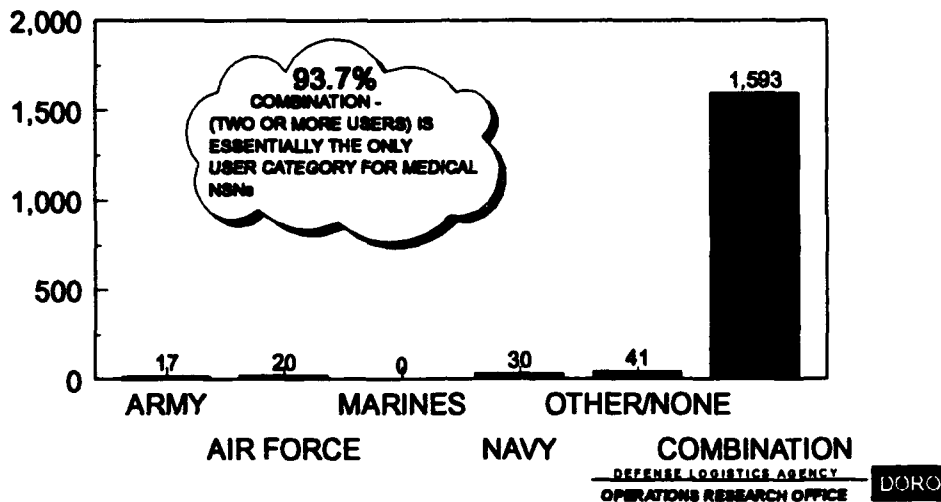
As this chart shows, 94% of medical NSNs are coded as multiple user so there is essentially only one user category for medical.

We can now draw the following conclusions from the examination of demand probabilities based on user codes: (1) items coded as having no designated user have demand probabilities that can be significantly below the commodity average, (2) with the exception of Medical, items coded as having multiple users can have demand probabilities significantly above the commodity average, and (3) single user coded items have demand probabilities clustered around the commodity averages. As a result of having demand probabilities higher than the commodity average, we will specifically examine the sensitivity of our cost model results to multiple user coded items later on in the briefing.
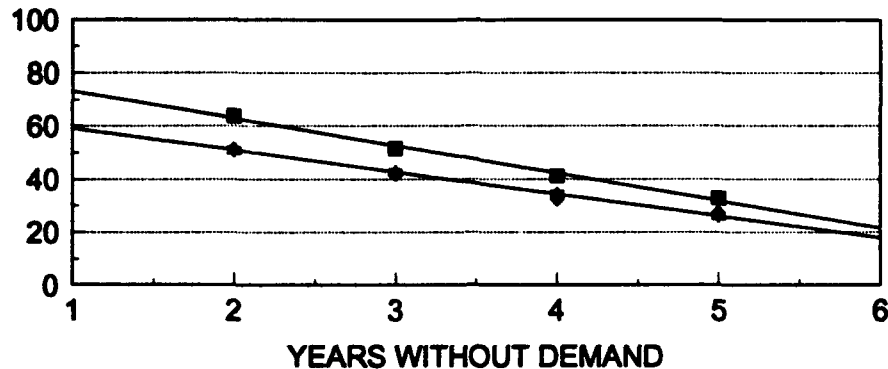
We can also look at probabilities grouped by Mobilization Reserve code and by Weapon System Indicator code. First by Mobilization Reserve code.

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CONDITIONAL PROBABILITY OF DEMAND

INDUSTRIAL COMMODITY

MOBILIZATION RESERVE REQUIREMENT

Probability of Demand (%)

YEARS WITHOUT DEMAND

RESERVE   NONE   COMMODITY

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This chart is typical of the probability stratifications by Mobilization Reserve Requirement for all commodities except Medical. The spread between the high and low probabilities in this chart for Industrial is the largest of all the commodities. The general characteristics are: (1) NSNs with no reserve requirements are slightly (1%) below the commodity average, (2) NSNs with reserve requirements have probabilities slightly above the commodity average, and (3) the difference between the probabilities never exceeds 10%. The chart shows that while Mobilization Reserve coded items do differ slightly from the commodity average, the difference is not large particularly when compared with the differences using User code as a grouping.

As we mentioned, Medical differs slightly from the other commodities.

CONDITIONAL PROBABILITY OF DEMAND

MEDICAL COMMODITY

MOBILIZATION RESERVE REQUIREMENT

RESERVE   NONE   COMMODITY

Medical is slightly the reverse of the other commodities - the probabilities are very close to one another, but NSNs with reserve requirements are below the commodity average for zero demand years two through three.

The last probability grouping is stratified by Weapon System Indicator codes.

CONDITIONAL PROBABILITY OF DEMAND

GENERAL COMMODITY

WEAPON SYSTEM INDICATOR

Probability of Demand (%)

YEARS WITHOUT DEMAND

INOPERABLE   NONE   COMMODITY

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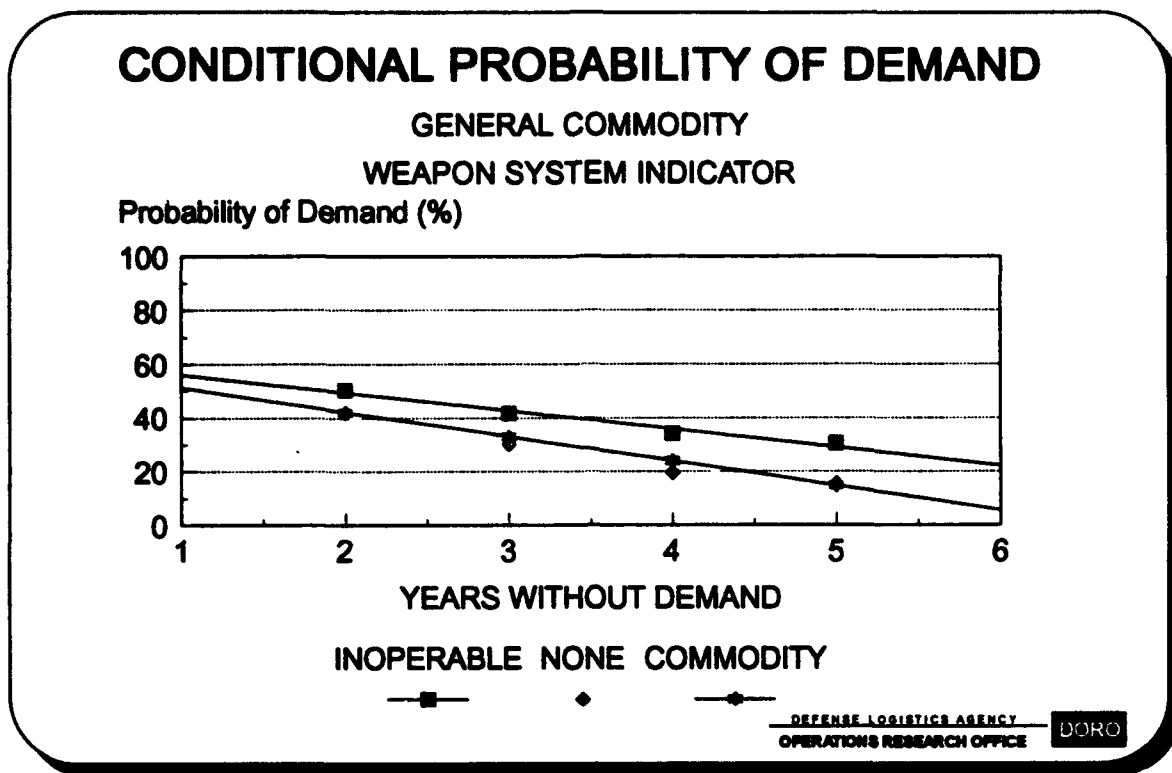
This chart is typical of the demand probabilities for the hardware commodities grouped by Weapon System Indicator code. None of the commodities had any zero demand NSNs that were coded for safety legal operation (W). The general characteristics of these charts are: (1) the demand probabilities for NSNs with a code indicating that they can render a weapon system inoperable are consistently 1-16% above the commodity average although the number of such NSNs is small (4-10%), and (2) NSNs with no code or with a code that indicates a weapon system is not rendered inoperable closely follow the commodity average. Demand probabilities for Medical are similar to those for the hardware commodities except that the inoperable coded items have demand probabilities of 100% for zero demand years two through four and 0% for year five. The number of Medical NSNs involved with this coding (1-6) is extremely small and, as mentioned earlier, this sample size is causing the turbulence we see here. Textiles did not have items coded in the first two groupings (inoperable or safety legal); they all fall into the third grouping of no code or don't render a weapon system inoperable.

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COST MODEL

- **GENERAL APPROACH**

- **ASSUMPTIONS**

- **MODEL DESCRIPTION**

- **COSTS**

We have now completed the discussion of how the zero demand NSNs were selected, what they look like by commodity, and how the demand probabilities shake out by various groupings. Although the regression lines show that the demand probabilities behave predictably at the commodity level, it is the nature of averages to mask variations in individual behavior. Because of differences in item cost, stockage quantities, and demand characteristics, we will use probabilities at the FSC level within commodity rather than at the commodity level for out retention limit analysis. We will examine the retention limit effects of FSCs with probabilities that vary significantly from their commodity averages separately. We will also look at the effects of User codes, Weapon Sytem Indicator codes, and Mobilization Reserve codes separately.

The next section of the briefing deals with the development of the expected value cost model. The model will use our demand probabilities to calculate costs to support the retention limit analysis. This portion of the briefing follows the outline shown here.

DEFINITION

ECONOMIC RETENTION LIMIT

THE POINT AT WHICH THE COST TO HOLD AN ITEM EXCEEDS THE COST TO DISPOSE OF IT AND REPROCURE IF NECESSARY TO MEET FUTURE DEMANDS

This operating definition of economic retention limit will establish the basis for our model development and for further analysis. The cost model will consider the probability of demand associated with zero demand NSNs and all of the significant costs associated with hold versus dispose options. It will be used to identify economic retention limits and to recommend a retention policy or policies based on commodity and sub-commodity stratifications.

COST MODEL - GENERAL APPROACH

FOR EACH ZERO DEMAND NSN, FOR EACH ZERO
PERIOD, COMPARE THE COST TO...

RETAIN — DISPOSE

Storage & Issue | OR | Disposal & Reprocurement

TO MEET

Expected Future Demands
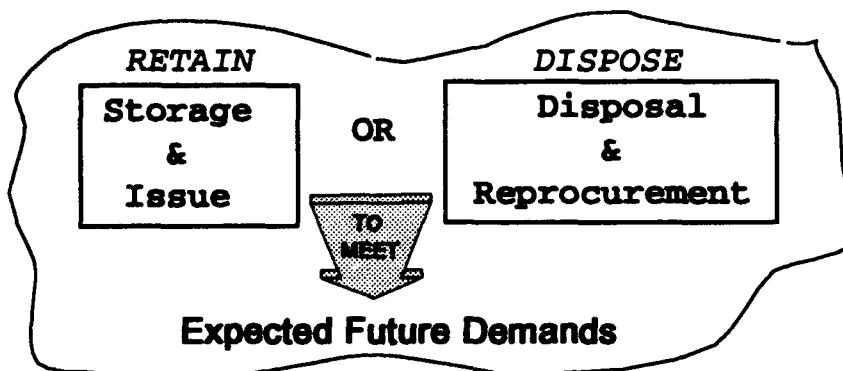
AND, IDENTIFY THE ECONOMIC RETENTION LIMIT.

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The general approach for development of the cost model was to take each zero demand NSN for each zero demand period (two, three, four, or five years) from our data base and compare the average five year cost associated with retaining the NSN in stock versus disposing of it while meeting the requirements of a projected future demand stream. The demand projections were based on FSC averages for demand probability, demand frequency within the four to six year window after the base year, and the dollar value requested per demand. This diagram shows basic costs associated with the two options. If an item is retained in stockage, there is an associated storage cost and a cost to process an issue for each demand. If an item is disposed of, there is a net disposal cost which consists of the cost of processing the item for disposal and the salvage value realized from the actual disposal. Finally, there is an item reprocurement cost associated with each demand. If an item is no longer stocked, it must be reprocured if it is demanded. The zero demand year at which disposal costs became less than holding costs locates the theoretical retention limit.

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COST MODEL
SIMPLIFYING ASSUMPTIONS

- **Future demands for zero demand NSNs will be random and independent**
- **There will be no stock outs or stock buys for zero demand items retained in stockage**
- **Demands for zero demand disposal items will be delivered by direct vendor delivery**
- **There will be no returns**

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These assumptions simplify the process of developing the cost model. The assumption that any future demands will be random and independent allows us to use the characteristics of a Poisson process to predict when future demands will occur. Since a retention limit can only be computed for NSNs that have an issuable asset quantity (IAQ) and since subsequent demands will, in most instances, be small and infrequent over our five year computation period, the assumption concerning stockouts and stock buys is reasonable. Direct vendor delivery of non-stocked items is a normal occurrence and, the lack of or refusal to accept returns for zero demand items is also reasonable.

COST MODEL

- **Small, FORTRAN based (< 200 lines)**
  - **Exponentially distributed demands**
  - **Parameter driven**
- **Averages 5 year projected costs from three base years (86, 87, 88)**
- **Costs discounted to 1986 $**
- **Input: NSN, IAQ, unit price, zero demand length**
- **Data Base: FSC average demand probability, frequency, quantity, and # stockage locations**

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Due to uncertainty in several of the cost factors, the costs were set up in the model as parameters so that some sensitivity analysis could be easily conducted around them. Unlike a traditional sensitivity analysis with a wide range of values for each factor, however, only two values were used for variables which the study sponsor considered the softest. The first set of values consisted of factors currently used and accepted that we call the "standard" values or favorable rates in this study. The second set of values were the highest or most unfavorable possible as identified by the study sponsor based on his experience. It was concluded that there was no need to go below the standard values since that would be unrealistic. Our sensitivity analysis therefore only looked at the maximum range of cost factors from a best to worst case perspective. The model is an expected value cost model which computes the five year costs of holding versus disposing of assets while meeting the requirements of possible future demands that are based on empirically developed FSC demand characteristics. The number of stockage locations was used to determine the number of disposal actions required to remove an NSN from inventory. All costs were discounted to constant 1986 dollars using a 3.6% discount factor. Now we will discuss the actual costs that were used in the model.

COST RANGE

COST FACTOR	FAVORABLE	UNFAVORABLE
HOLDING COST	1%	10%
ISSUE COST	95 DBOF	
DISPOSAL RATE *	10.4%	0%
PREMIUM PRICING	100%	400%
REPROCUREMENT	MULTIPLE COST EOQ STUDY	

* Net salvage value

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chart shows the range of values used in the analysis for each of the cost factors. The issue cost and the reprocurement costs were considered to be well developed costs and therefore were not varied. The other costs (holding, disposal rate and premium pricing) were considered "soft" by the study sponsor and therefore were represented as ranges. The ranges between Favorable (least cost, highest return) and Unfavorable (highest cost, lowest return) were selected by the study sponsor to bracket possible error in those numbers. The 1% holding cost and 10.4% disposal rate have been used and accepted as "standard" rates. The 1992 SYNERGY Cost to Hold study developed a DLA EOQ storage cost factor estimate of 0.9% to 1.30%. The 10.4% disposal rate was originally developed during the 1986 Economic Returns/Retention Limits study, however, the basis for developing it was not entirely clear. In the context of this analysis, earlier studies using standard rates have looked at the costs in the most favorable light possible. Holding cost is expressed as a percent of asset value and represents the cost to maintain an item in inventory. Issue cost represents the cost to process an item for issue to either a customer or for disposal. The proposed 95 DBOF costs were used for issue costs, either to a customer or to a DRMO, without any range. The disposal rate represents the net salvage value from a disposal action. It is a return rather than a cost. Premium pricing represents the percentage of item price that must be paid for item that has been deleted from the inventory and represents the difficulty to remanufacture or item scarcity. It represents an increase in the item price and does not include the cost of processing the reprocurement action. Reprocurement or order processing costs were drawn from the 1989 SYNERGY Multiple Cost EOQ Study using the Small Manual Cost to Order costs minus the depot receipt portion. Reprocurement only applies to disposal actions and since we have assumed direct vendor delivery for those demands, there is no depot receipt.

FY95 AVERAGE DBOF ISSUE COST

CONSTRUCTION	$20.57
ELECTRONICS	$13.07
GENERAL	$24.80
INDUSTRIAL	$17.19
MEDICAL	$22.42
C&T	$20.81

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These proposed 95 DBOF issue charges were developed by the Comptroller's office at DLA Headquarters. The costs were developed by using FY 93 costs grouped by cost account code and apportioned between processing and storage. The proposed issue costs were stratified by the type of issue (bin, medium bulk, heavy bulk/hazardous, and transshipment) and whether the issues were on or off base. Off base issues included second destination charges. While these issue charges were only proposed, they were viewed as the best available and certainly better than the 94 DBOF flat rate charge of $29.00 per issue. The charges on this chart are the commodity averages based on the commodity work mixes between the types of issues.

MULTIPLE COST EOQ STUDY REPROCUREMENT COSTS

CONSTRUCTION	$ 95.00
ELECTRONICS	$ 93.00
GENERAL	$ 88.00
INDUSTRIAL	$ 96.00
MEDICAL	$ 94.00
C&T	$229.00

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These reprocurement costs were derived from the December 1989 Multiple Cost EOQ Study conducted by SYNERGY, Inc. The costs used from the study were the ICP Administered Small Manual Cost to Order developed using wage rates, personnel grades, the tasks involved and the performance standards for those tasks. The depot receipt portion of those tasks was removed from each ICP total, because this analysis precludes depot receipts.

Next, we will look at the retention limit results based on the model output. The next six sets of charts and tables are based on commodity averages.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE

CONSTRUCTION
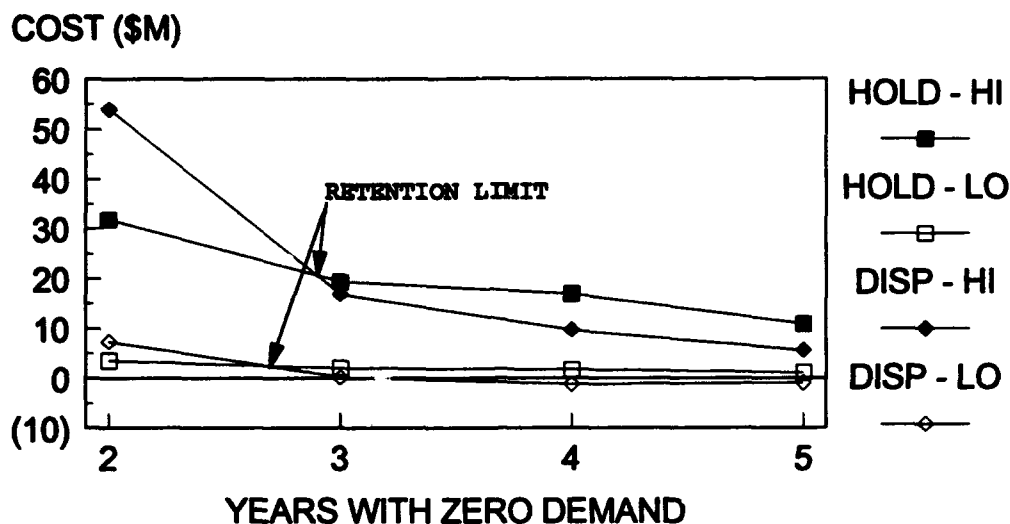
This chart shows the maximum range of five year costs for the Construction commodity of both holding and disposing of zero demand items. The upper pair of lines represents the highest cost for holding (HOLD-HI) and disposing (DISP-HI) using the unfavorable cost factors. The lower pair of lines represents the lowest cost for holding (HOLD-LO) and disposing (DISP-LO) using the favorable cost factors. If our cost factors have bracketed the true costs, then the cost of holding versus disposing should fall somewhere between these two sets of lines. The retention limit is the point on the chart where disposal costs fall below holding costs. For the construction commodity, the retention limits are the same (three years) for the low cost and the high cost cases. The difference in total cost between the two cases is considerable but the theoretical retention limit is the same. It is significant to note on this chart and most of the following charts that: (1) total costs become smaller and closer together as the zero demand period becomes longer i.e. total costs are less sensitive to the factors involved at five years than they are at two, and (2) total costs using unfavorable rates (high cost) decrease sharply after a two year retention limit and tend to flatten out towards the five year limit. The following table shows how different combinations of favorable and unfavorable cost factors affect the retention limit.
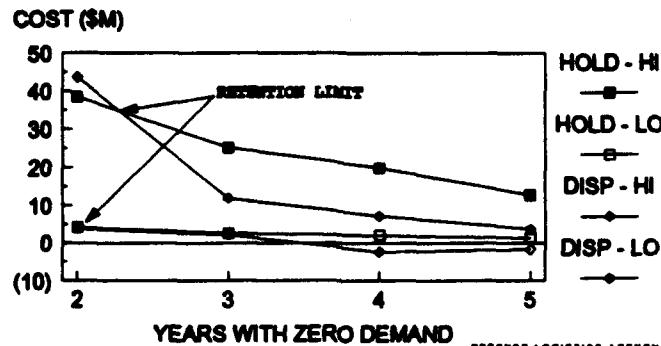
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RETENTION LIMIT TABLE
CONSTRUCTION

COST FACTORS

Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	3 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	3 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	3 YEARS

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This table shows the effect of having different combinations of favorable (lowest cost, highest return) and unfavorable (highest cost, lowest return) cost factors. The last case in the table, the all favorable case, is based on cost factors that have been the accepted standard for the last several years. The table clearly shows that different combinations of cost factors can produce different retention limits. Since the retention limit is based on the relationship between holding costs and disposal costs, cost factors which favor one option over the other can produce predictable results. For example, if the cost factors favor disposal (favorable disposal rate and/or favorable premium pricing) relative to holding (unfavorable storage cost) then we would expect disposal costs to fall below holding costs very early yielding a short retention limit. In the case of Construction, the table shows that disposal costs can be less than holding costs after only two years of zero demand under these circumstances. If the opposite is true, holding is favored over disposal, then disposal costs may never (in the two to five year scope of this analysis) fall below holding costs. In the case of Construction, the retention limit exceeds five years in all of these instances. The cost range and retention limits for Electronics are shown on the next chart.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE
ELECTRONIC

COST ($M)

50			HOLD - HI
40	RETENTION LIMIT		
30			HOLD - LO
20			
10			DISP - HI
0			
(10)			DISP - LO

YEARS WITH ZERO DEMAND

RETENTION LIMIT TABLE
ELECTRONIC

COST FACTORS

Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	3 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	5 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	5 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	2 YEARS

This chart and table show the five year retention limit cost ranges and the cost factor impacts for the Electronic commodity. Again, the chart shows the extreme cases - all favorable or all unfavorable. The retention limits tend to the two to three year range as long as holding costs are not favored over disposal costs. Two years would be the retention limit using the "standard" cost factors. Next we have the General commodity.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE

GENERAL

COST ($M)

```
25
20         RETENTION LIMIT              HOLD - HI
15                                       
10                                      HOLD - LO
 5                                       
 0                                      DISP - HI
(5)                                      
    2        3        4        5        DISP - LO
         YEARS WITH ZERO DEMAND
```

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RETENTION LIMIT TABLE

GENERAL

COST FACTORS

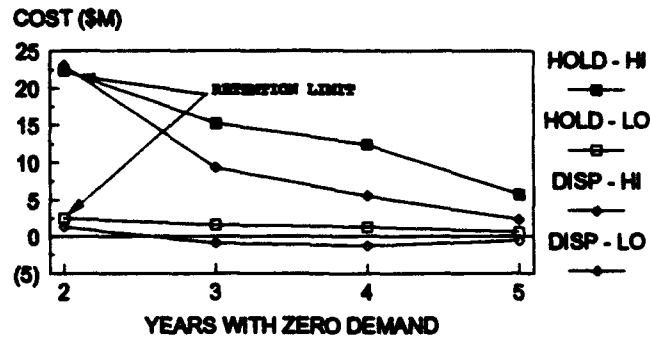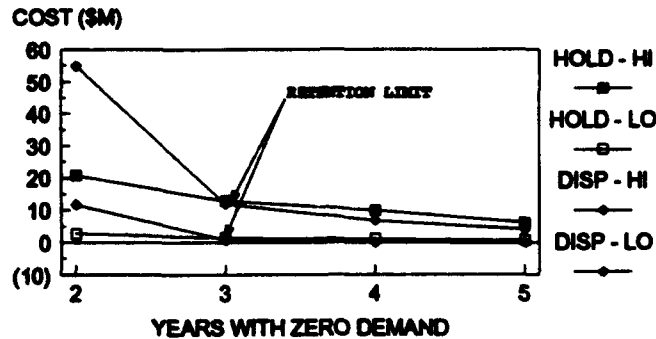| Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	3 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	2 YEARS

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This is the cost range chart and retention limit table for the General commodity. This commodity is interesting because while the extremes are at or very close to a two year retention limit, it can very easily be greater than five depending upon the mix of costs. There doesn't appear to be a middle ground.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE
INDUSTRIAL

COST ($M)

HOLD - HI	
HOLD - LO	
DISP - HI	
DISP - LO	

YEARS WITH ZERO DEMAND

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RETENTION LIMIT TABLE
INDUSTRIAL

COST FACTORS

Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	3 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	3 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	2 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	2 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	3 YEARS

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This is the cost range and retention limit table for the Industrial commodity. It is identical to that for Construction. All of the hardware commodities, in fact, are very similar. The standard cost factors would support a retention limit of two to three years for the hardware commodities but, as the tables have shown, the limits can vary significantly from standard depending upon the rates actually used. As we will see later, there is some risk associated with accepting a retention limit below five years for the hardware commodities. Medical and Textiles have retention limits very different from the hardware commodities.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE
MEDICAL

COST ($M)

YEARS WITH ZERO DEMAND

HOLD - HI
HOLD - LO
DISP - HI
DISP - LO
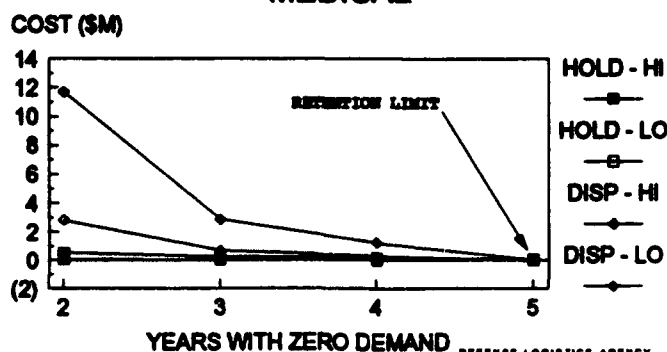
RETENTION LIMIT

RETENTION LIMIT TABLE
MEDICAL

COST FACTORS

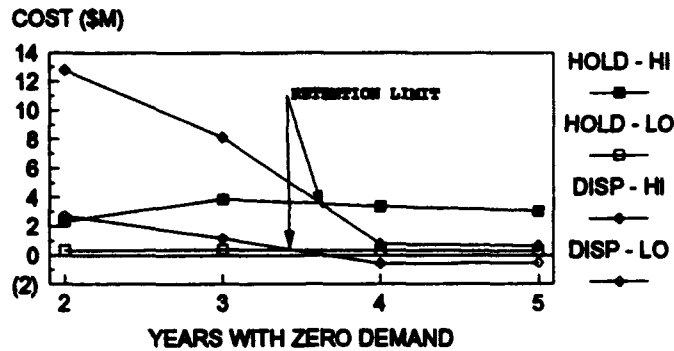| Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	5 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	5 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	>5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	5 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	5 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	5 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	5 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	5 YEARS

As the chart and table show, Medical behaves very differently from the hardware commodities.
The retention limit is clearly five years regardless of the cost factors. The reason for this, as the
commodity probability chart showed earlier, is that the demand probabilities for medical are much
higher at zero demand years two through four than for the other commodities.

HOLD VERSUS DISPOSE

5 YEAR COST RANGE

TEXTILE

COST ($M)

HOLD - HI
HOLD - LO
DISP - HI
DISP - LO

RETENTION LIMIT

YEARS WITH ZERO DEMAND

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RETENTION LIMIT TABLE

TEXTILE

COST FACTORS

Premium	Storage	Disp Rate	RETENTION LIMIT
UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	4 YEARS
UNFAVORABLE	UNFAVORABLE	FAVORABLE	4 YEARS
UNFAVORABLE	FAVORABLE	UNFAVORABLE	5 YEARS
FAVORABLE	UNFAVORABLE	UNFAVORABLE	3 YEARS
UNFAVORABLE	FAVORABLE	FAVORABLE	4 YEARS
FAVORABLE	UNFAVORABLE	FAVORABLE	3 YEARS
FAVORABLE	FAVORABLE	UNFAVORABLE	4 YEARS
FAVORABLE	FAVORABLE	FAVORABLE	4 YEARS

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Textile is also clearly different from the hardware commodities in that its retention limit is generally around four years. The next series of tables address the question: What is the effect on the retention limit of FSCs that have demand probabilities that are higher than the commodity averages? In other words, how sensitive are the retention limits to variant FSCs?

FSC VARIANCE

WHAT IS THE EFFECT OF FSCs THAT VARY FROM COMMODITY MEAN?

- Demand probability more than 10% greater than commodity average at each zero demand level

- Constitute a significant proportion of commodity zero demand NSNs

CONSTRUCTION - 4730, 4820   ELECTRONIC - 5930, 5935, 5961

GENERAL - 5940, 5970, 6210   INDUSTRIAL - none

MEDICAL - 6505   TEXTILE - 8345, 8405

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In order to determine the sensitivity of the retention limits to differences in FSC demand probabilities, FSCs were chosen within each commodity that met the following criteria: (1) Their demand probabilities were at least 10% higher than the commodity average, and (2) as a group they consitituted a significant proportion of the commodity NSNs. Significant was defined as having FSCs represented in all four zero demand periods (two, three, four, and five years), and constituting , as a group, a substantial portion of the commodity NSN population. These criteria were selected after examining the data in order to provide the most likely candidates capable of having higher retention limits at the FSC level and of influencing the commodity retention limits as a whole. The FSCs which met these criteria are shown in the chart above next to their respective commodities. There were no Industrial FSCs which met the criteria. Medical had one FSC meeting the criteria which represented 3.9% of the population. The hardware commodities all had candidates representing 25%-28% of the population. The next two charts show what the retention limit effect these FSCs have if they are examined as a separate group relative to their commodity averages and if the commodities are examined without them.

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FSC VARIANCE
RETENTION LIMIT CHANGES
VARIANT FSCs ONLY

COST FACTORS			COMMODITY				
Prem	Store	Disp	C	E	G	M	T
UNFAV	UNFAV	UNFAV	4(3)				
UNFAV	UNFAV	FAV	4(3)		3(2)		
UNFAV	FAV	UNFAV					>5(5)
FAV	UNFAV	UNFAV					4(3)
UNFAV	FAV	FAV					>5(4)
FAV	UNFAV	FAV					4(3)
FAV	FAV	UNFAV			---		>5(4)
FAV	FAV	FAV		3(2)	3(2)		

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This table shows, for each commodity, what the retention difference from the commodity average is for the variant FSCs as a group by themselves. Blank entries in the table indicate no change. Otherwise, the retention limit is shown with the commodity average shown in parenthesis. The table shows that in some instances, these FSCs, by themselves, have retention limits one year greater than the commodity average. The direction of this change is reasonable since the probabilities of demand for these FSCs are higher and the disposal costs can therefore be higher. Textiles can go beyond five years in some instances but how far beyond is unknown. The next table looks at the effect on the commodity retention limits if the variant FSCs are removed from the commodity..

FSC VARIANCE
RETENTION LIMIT CHANGES
WITHOUT VARIANT FSCs

COST FACTORS			COMMODITY				
Prem	Store	Disp	C	E	G	M	T
UNFAV	UNFAV	UNFAV		2(3)	2(3)		3(4)
UNFAV	UNFAV	FAV					3(4)
UNFAV	FAV	UNFAV					
FAV	UNFAV	UNFAV					2(3)
UNFAV	FAV	FAV		4(5)			
FAV	UNFAV	FAV					2(3)
FAV	FAV	UN		4(5)			
FAV	FAV	FAV					3(4)

This table shows the effect of removing the variant FSCs from the commodities and recomputing the retention limits. Only the differences are shown with the old commodity averages shown in parenthesis. With the exception of Textiles, the commodities aren't very sensitive to variant FSCs. The fact that retention limits are integerized accounts for this. Textiles is affected the most because the probability difference of the variant FSCs is significantly higher (130%-331%) than the commodity average - enough to pull the average towards a longer retention limit.

The next series of tables looks at the retention limit effects of other NSN groupings - by User code, by Mobilization Reserve code, and by Weapon System Indicator code.

RETENTION LIMITS

USER CODE

(COMBINATION USERS)

COST FACTORS			COMMODITY					
Prem	Store	Disp	C	E	G	I	M	T
UNFAV	UNFAV	UNFAV	4(3)			4(3)		3(4)
UNFAV	UNFAV	FAV		3(2)	3(2)			3(4)
UNFAV	FAV	UNFAV						4(5)
FAV	UNFAV	UNFAV	3(2)		3(2)			
UNFAV	FAV	FAV		>5(5)				
FAV	UNFAV	FAV	3(2)		3(2)			
FAV	FAV	UN		>5(5)				
FAV	FAV	FAV			3(2)	4(3)		3(4)

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This table addresses the question of whether NSNs with specific User codes behave differently than their respective commodities. The retention limits for NSNs that are coded with User codes indicating a combination of several users are shown on this table. Blanks in the table indicate no change and the commodity average is shown in parenthesis. User code effects were examined by looking at those NSNs with a User code grouping that had a probability of demand higher than the commodity average. This would generally favor longer retention limits. From the User code probability chart we saw earlier, combination or multiple users generally have higher probabilities of demand; single users stay around the commodity average with the exception of Textiles where they are above the average; and NSNs with no designated user have probabilities below the commodity average. Medical NSNs essentially only have one user code which is, of course, the commodity average. This table shows that in some instances, and with the exception of Textiles, the retention limit is increased. In the case of Textiles, the table indicates that the dollar value of the stockage for these NSNs is high relative to their demand frequency and quantity. In this case, it is easier for disposal costs (and proceeds) to fall below holding costs even with high reprocurement costs and premium pricing.

RETENTION LIMITS

MOBILIZATION RESERVE REQUIREMENT

COST FACTORS			COMMODITY					
Prem	Store	Disp	C	E	G	I	M	T
UNFAV	UNFAV	UNFAV	2(3)	2(3)	2(3)	2(3)	4(5)	
UNFAV	UNFAV	FAV	2(3)			4(3)	4(5)	3(4)
UNFAV	FAV	UNFAV						>5(5)
FAV	UNFAV	UNFAV			3(2)	4(2)		
UNFAV	FAV	FAV	3(>5)	3(5)	4(>5)	5(>5)		
FAV	UNFAV	FAV						2(3)
FAV	FAV	UN	3(>5)	3(5)	3(>5)	5(>5)	>5(5)	
FAV	FAV	FAV	2(3)					3(4)

Do NSNs with war reserve requirements behave differently from their commodity averages? The retention limits for NSNs that are coded as having mobilization reserve requirements are shown on this table. The limits are, in many cases, less than their respective commodity averages (shown in parenthesis) and there are many more changes than found using FSC differences. This means that economically, these NSN could theoretically be disposed of a year earlier than the other members of their commodity. However, the decision to retain war reserve items must be a management decision and not an economic one. War reserve means that the items are being stocked as a reserve in the event of mobilization or war in order to meet demand that is expected under those circumstances regardless of current or past demand. If no mobilization or war requirement is expected, then the items should be recoded and the normal economic retention rules applied.

RETENTION LIMITS

WEAPON SYSTEM INDICATOR CODE

(RENDERS SYSTEM INOPERABLE)

COST FACTORS			COMMODITY					
Prem	Store	Disp	C	E	G	I	M	T
UNFAV	UNFAV	UNFAV				4 (3)	3 (5)	
UNFAV	UNFAV	FAV		3 (2)			3 (5)	
UNFAV	FAV	UNFAV					5 (>5)	
FAV	UNFAV	UNFAV					2 (5)	
UNFAV	FAV	FAV		>5 (5)			3 (5)	
FAV	UNFAV	FAV					2 (5)	
FAV	FAV	UN		>5 (5)				
FAV	FAV	FAV		3 (2)			3 (5)	

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Do NSNs with weapon system impacts behave differently from their commodity averages? The retention limits for NSNs with Weapon System Indicator codes showing that they can render a weapon system inoperable (X) are shown on this table. There were no zero demand NSNs coded for safety legal (W). There were no Textile NSNs with either a safety legal or inoperable weapon system code. Except for Medical which has such a small sample size (1-6 NSNs) that the results are volatile, the overall impact of weapon system codes is relatively small. Like mobilization reserve items, the retention decision must be a management one rather than an economic one. How much risk is management willing to take in order to dispose of these items?

ZERO DEMAND RETENTION LIMIT

STANDARD POTENTIAL ANNUAL SAVINGS (LOSS) ($M)

COMMODITY

		C	E	G	I	M	T
Y	2	(.77)	.06	.23	(1.80)	(.55)	(.48)
E	3	.37	.95	.50	.13	(.13)	(.15)
A	4	.95	.87	.51	.22	(.05)	.18
R S	5	.41	.61	.24	.16	.04	.17

As we mentioned earlier in the briefing, standard cost factors are those factors, in part or in total, that have previously been used and accepted in studies within DLA. They basically represent the all favorable case in our retention limit tables - 1% holding cost, 10.4% salvage value, and no premium pricing. This table shows the potential annual savings or cost in parenthesis based on those cost factors. The table clearly shows that in order to achieve operating savings based on standard costs: (1) the hardware commodities (C,E,G,I) are split between two and three year retention limits, (2) Medical requires a five year retention limit, and (3) Textiles require a four year retention limit. The best and worst case results are shown next using the extreme results from our cost model.

ZERO DEMAND RETENTION LIMIT

MAXIMUM POTENTIAL ANNUAL SAVINGS / (LOSS) ($M)

COMMODITY

		C	E	G	I	M	T
Y	**2**	6.20 / (10.10)	6.91 / (7.89)	4.21 / (4.23)	1.81 / (10.42)	0.0/ (2.32)	0.0/ (2.49)
E	**3**	3.83 / (2.97)	5.46 / (1.85)	3.23 / (1.55)	2.42 / (2.09)	0.0/ (.56)	.54 / (1.55)
A **R**	**4**	3.61 / (1.59)	4.42 / (1.02)	2.73 / (.84)	1.97 / (1.15)	0.0/ (.24)	.79 / (.087)
S	**5**	2.36 / (.89)	2.88 / (.46)	1.26 / (.34)	1.25 / (.64)	.02 / (.001)	.71 / (.068)

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This table summarizes the **maximum** potential annual savings or losses (best and worst cases) for each commodity for each retention limit. The values in the table are based on two extremes of cost factor combinations: (1) unfavorable holding costs and favorable disposal costs versus (2) favorable holding costs and unfavorable disposal costs. For example, if you selected a two year retention limit for the Construction commodity, you could either save $6.2 million or lose $10.10 million depending upon which extreme the cost factors were at. For Medical, you can only lose until year five. The savings and losses fall into three categories - high risk, medium risk, and low risk. Looking at the table as a whole, a five year retention limit offers the lowest savings and the lowest potential loss - it is the low risk option. A two year retention limit offers the highest potential savings but also the highest potential loss - it is the high risk option. The three and four year retention limits are very similar to each other and fall between the two and five year limits in terms of risk. In selecting a retention limit, it all depends on which cost factors you want to believe. They make a very real difference. The standard costs favor shorter retention limits for everything except Medical but, as this table shows, that may not be the most cost effective choice.

RETENTION LIMIT SUMMARY

- **Under most conditions, two years is not a cost effective retention limit.**

- **The retention limit for Medical zero demand NSNs should remain no less than five years.**

- **Different combinations of cost factor variations can create different retention limits.**

- **Total costs are less sensitive to variations in cost factors at higher retention limits.**

- **Under certain conditions, FSC variations within commodities can influence commodity retention limits.**

- **NSN groupings within commodities can have retention limits different from the commodity as a whole.**

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This chart summarizes the retention limit findings. The GAO is recommending a two year retention limit, but, as we have seen, that does not appear practical in most instances. The retention limit tables have also shown that if 1% (favorable) is a good value for holding costs (as it may be), then regardless of premium pricing, the retention limit is only sensitive to the net disposal rate. A favorable disposal rate can offset reprocurement costs but if the rate is soft and low, and there is a general feeling that it may be 2% or less, then reprocurement costs exceed holding costs and the retention limits immediately go to five years and beyond.

CONCLUSIONS

- **A two year zero demand retention limit is not cost effective as a general policy.**

- **A five year retention limit is very conservative as a general policy given the uncertainties associated with the related costs.**

- **If inventory reduction is a priority, a three, four, and five year retention limit for Hardware, Textiles, amd Medical commodities respectively would be of modest risk and reduce inventories by $176M and 3.5M cubic feet.**

- **Retention limits for weapon system and war reserve items must continue to be based on considerations other than cost.**

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This analysis has shown that a two year zero demand retention policy is economically viable only under certain combinations of cost factors. In most cases it is not a cost effective policy.

A five year across-the-board retention limit reduces inventories by $89.4M (1.1%) and 1.09M cubic feet (1.6%) with a standard cost savings of $1.63M per year and a possible range of $8.48 to -$2.4M. It is a low risk option. A two year across-the-board retention limit reduces inventories by $269.4M (3.4%) and 3.6M cubic feet (3.3%) but has a standard loss of $3.31 with a potential annual loss of $37.5M and a maximum gain of $19.1M. It is a high risk option. An alternative which can reduce inventories sooner, if that is a priority, with moderate risk is a three year limit for hardware commodities, four years for Textiles, and five years for Medical. This option can reduce inventories by $175.9M (2.2%) and 2.04M cubic feet (1.9%) with a standard annual savings of $2.17M and a potential savings of $15.75M to a loss of $8.5M.

Mobilization Reserve and Weapon System Indicator coded items can behave slightly differently than their commodities as a whole. Regardless of their behavior, the decision to retain or dispose must be based on considerations other than exclusively economic. Projected wartime requirements and a risk assessment must form a major part of the decision to retain or dispose of those items.

RECOMMENDATION

Stay with a five year zero demand retention limit policy until an accurate net disposal rate can be developed to enable the policy to be evaluated more precisely.

All of the retention limit options examined in this analysis will reduce inventories but only by a few percentage points. In that regard, they are all very similar. However, unless DLA is willing to accept potentially greater costs and longer customer wait times then, for the time being, it should stay with a five year retention limit as a general policy. Since the net disposal rate plays a significant role in offsetting disposal costs, a study should be initiated to determine exactly what the disposal rate is. Once all of the cost factors are known, the retention limit policy can be reevaluated with a greater degree of certainty.

ABSTRACT

DLA-94-P10085.   Zero Demand Retention Limits

This study evaluated several alternative policies for the retention of dead (zero demand) stock.
DLA currently uses a general five year zero demand retention limit. In 1992, the General
Accounting Office (GAO) recommended that DLA adopt a two year zero demand retention
policy. An abbreviated analysis conducted by DLA's Operations Research Office (DORO) in
1992 showed that if ~ ~wo year policy had been implemented in FY 86 and given the cost factors
that were used, t'   ,vould have been a cost avoidance for some commodities . This study
expanded that analy sis by looking at alternative two, three, four and five year policies and
considered all commodities, variations in cost factors, and the probabilities of zero demand stock
having future demands.

The results of this study show that retention limits can vary considerably depending upon the
holding and disposal cost factors used. The retention limits were determined using a cost model
that calculated the five year cost of both holding and of disposing of zero demand stock while
still meeting expected demands. Holding costs, issue costs, disposal costs, the net disposal rate
(salvage value), reprocurement costs, and reprocurement premium pricing were all considered in
the model. The model demonstrated that holding costs are generally favored over disposal and
reprocurement costs until the probabilities of demand become so low that the cost of
reprocurement is less than the cost to hold. This point generally occurs after five years without a
demand. The study also showed that the retention limit was sensitive to the net disposal rate
which was probably the most uncertain of the cost factors used in the study. Given the
uncertainty in the cost factors, and the overall risk in terms of cost and potential customer
support degradation, the study recommendation is to stay at a general five year retention limit for
all commodities and reevaluate the policy after a study is conducted to determine the actual net
disposal rate.

KEY WORDS: Zero Demand, Dead Stock, Retention Limits

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6. AUTHOR(S)

Mr. Bruce E. Lasswell

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